

Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P321742

Luminaire Tested: **GLEON-SA8D-827-U-T3R-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P321742  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-11)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA8D-827-U-T3R-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(8) 80 CRI, 2700K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III  
ROADWAY OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 35158 lumens  
Efficiency: N/A  
Efficacy: 68.8 lumens/watt  
Luminous Opening: Rectangular (W 2' x L: 1' x H: 0')  
IES Classification: Type III - Medium  
BUG Rating: B3 - U0 - G5

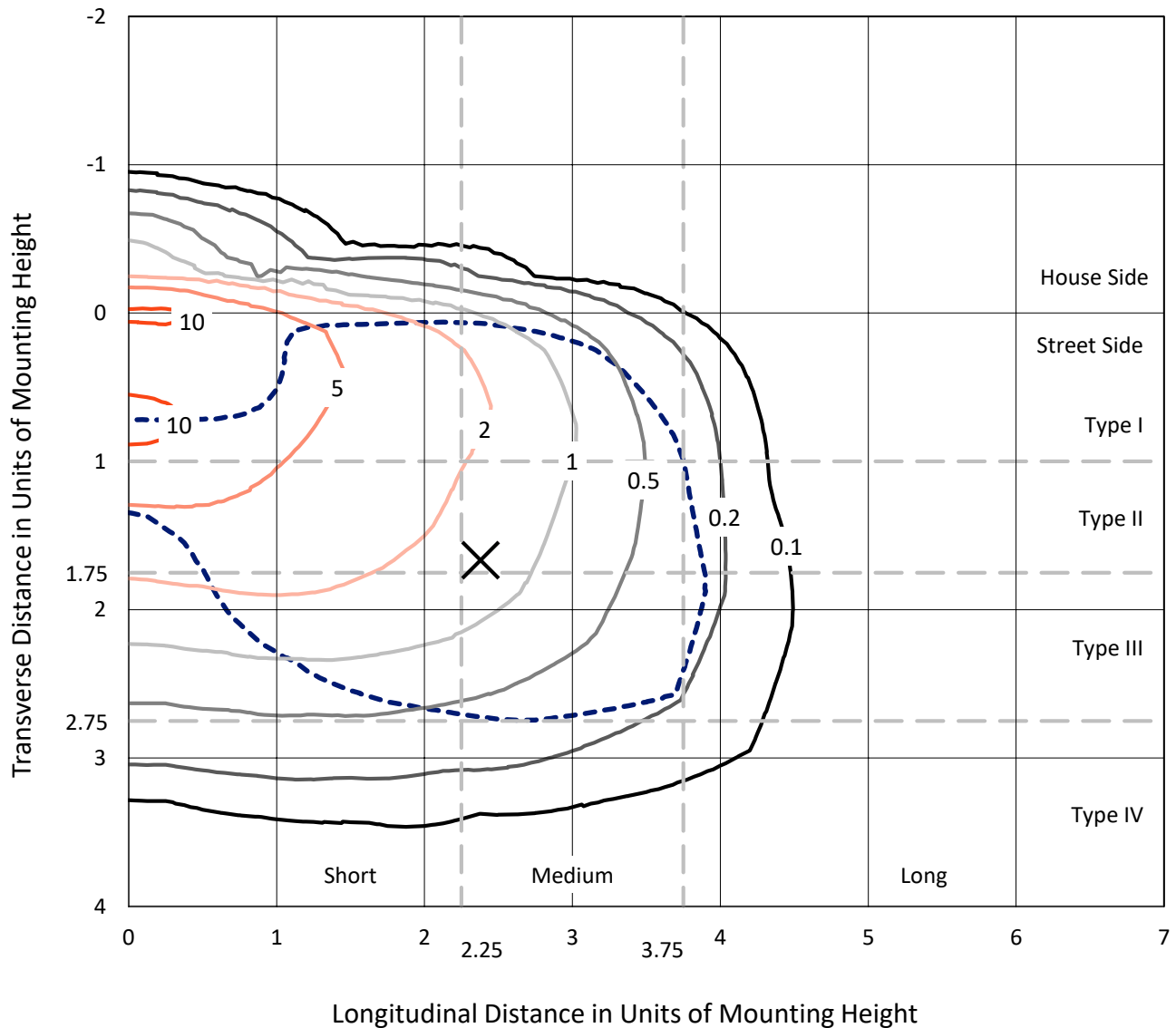
Input Watts (W): 511  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



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## Iso-Footcandle Lines of Horizontal Illumination

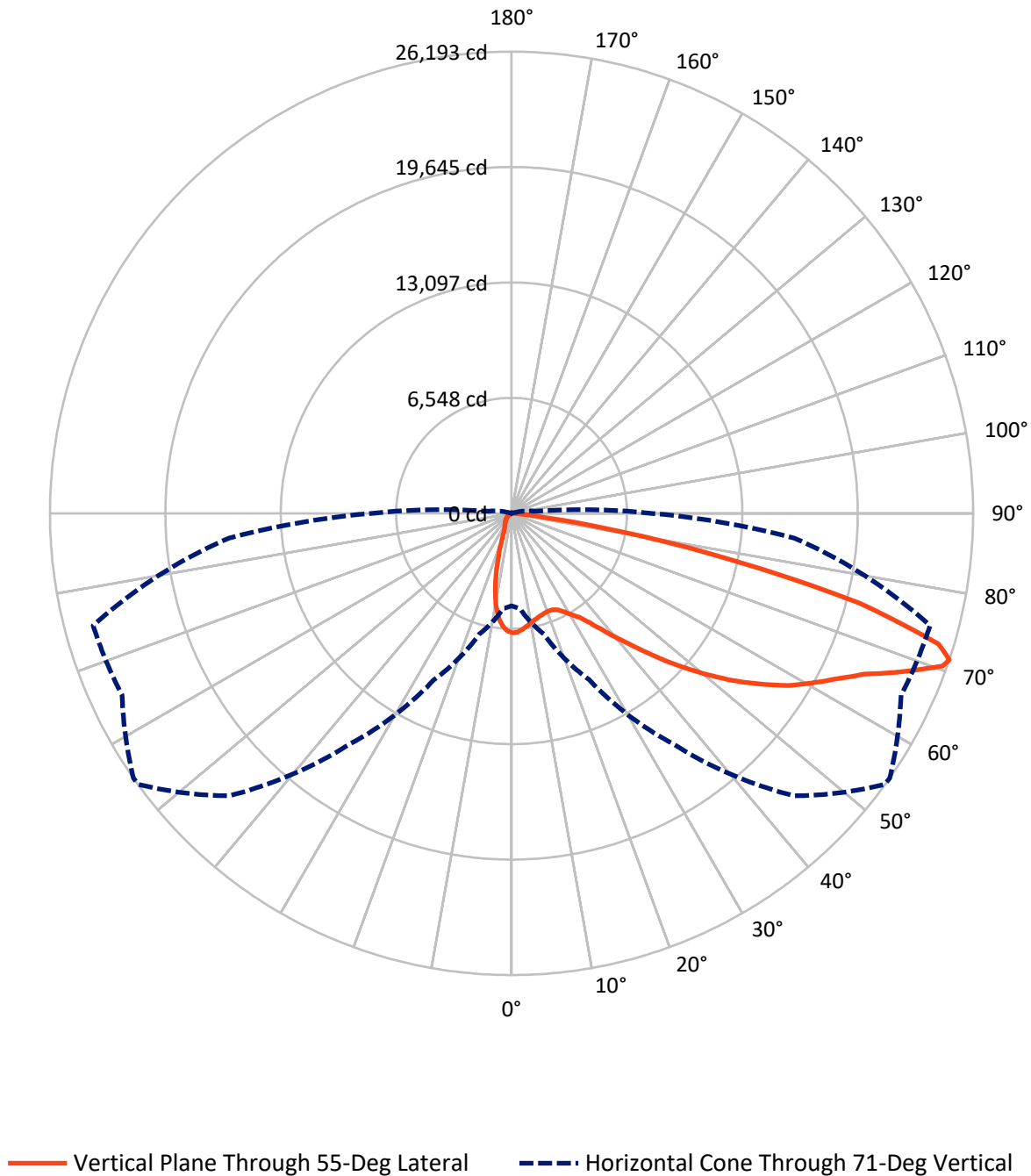
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 11.1 fc  
 Type III - Medium - N/A

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## Luminous Intensity Polar Plot



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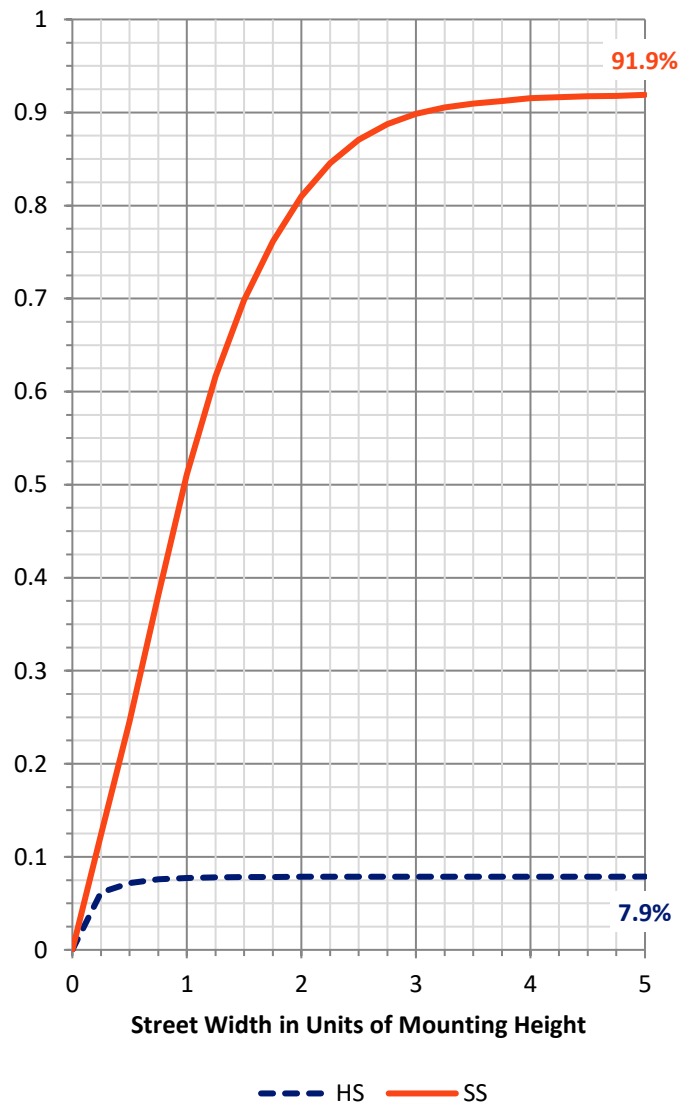
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 2783.5   | 0.0    | 2783.5  |
|                    | % Fixture | 7.9      | 0.0    | 7.9     |
| <b>Street Side</b> | Lumens    | 32374.4  | 0.0    | 32374.4 |
|                    | % Fixture | 92.1     | 0.0    | 92.1    |
| <b>Total</b>       | Lumens    | 35158.0  | 0.0    | 35158.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 578.1   | 1.6       |
| 10°-20°   | 1305.1  | 3.7       |
| 20°-30°   | 2097.4  | 6.0       |
| 30°-40°   | 3563.6  | 10.1      |
| 40°-50°   | 5531.1  | 15.7      |
| 50°-60°   | 7436.5  | 21.2      |
| 60°-70°   | 9097.3  | 25.9      |
| 70°-80°   | 5319.0  | 15.1      |
| 80°-90°   | 229.9   | 0.7       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 35158.0 | 100.0     |
| 0°-180°   | 35158.0 | 100.0     |

**Coefficient of Utilization**



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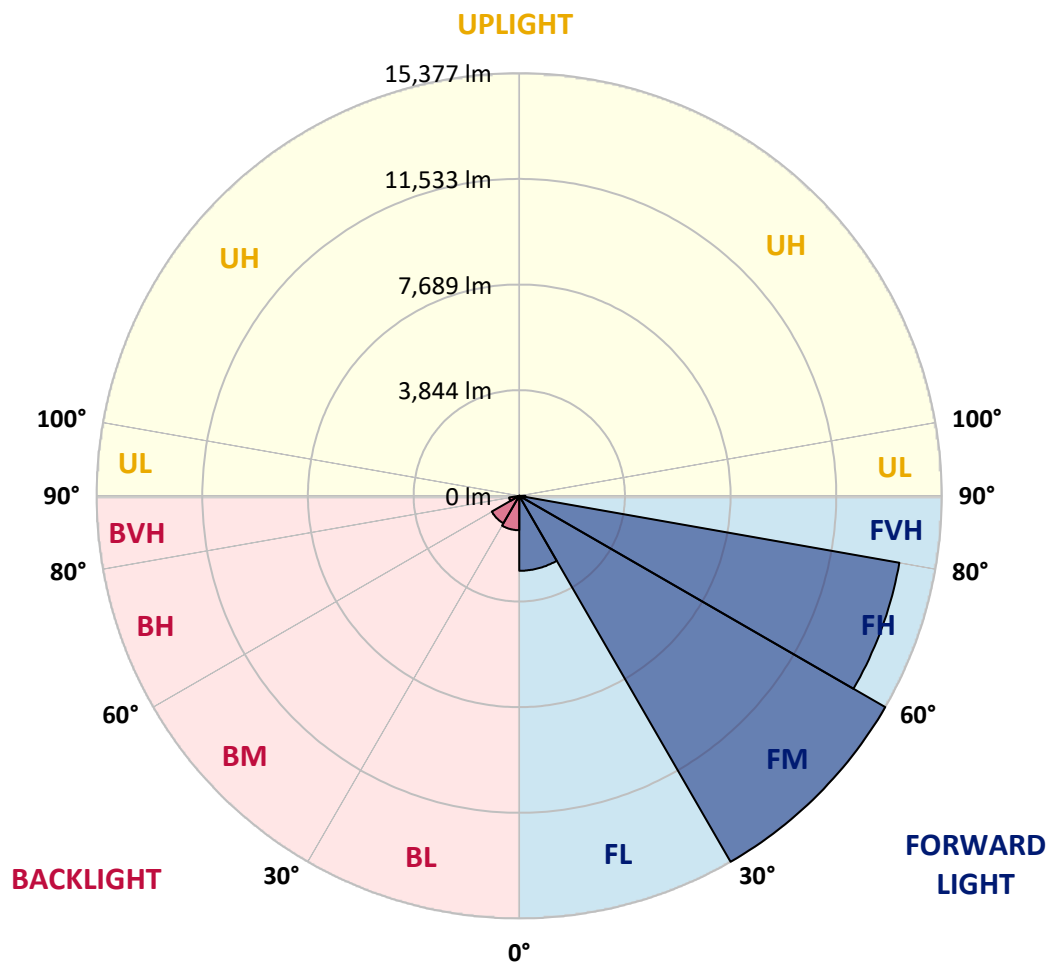
CATALOG NUMBER: GLEON-SA8D-827-U-T3R-HSS

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |        |
|------|-------------|---------|-----------|-------------------------|------|--------|
|      |             |         |           | B                       | U    | G      |
| FL   | (0°-30°)    | 2727.8  | 7.8       |                         |      |        |
| FM   | (30°-60°)   | 15377.1 | 43.7      |                         |      |        |
| FH   | (60°-80°)   | 14043.3 | 39.9      |                         |      | G5     |
| FVH  | (80°-90°)   | 226.3   | 0.6       |                         |      | G3/500 |
| BL   | (0°-30°)    | 1252.9  | 3.6       | B3/2500                 |      |        |
| BM   | (30°-60°)   | 1154.1  | 3.3       | B2/2500                 |      |        |
| BH   | (60°-80°)   | 372.9   | 1.1       | B1/500                  |      | G1/500 |
| BVH  | (80°-90°)   | 3.6     | 0.0       |                         |      | G0/10  |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |        |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |        |

**BUG Rating: B3-U0-G5**

Type III Medium



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**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 54°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  | 6780.3  |
| 2.5°  | 6581.4  | 6589.3  | 6617.7  | 6630.4  | 6660.4  | 6710.9  | 6736.1  | 6737.7  | 6778.8  | 6794.6  | 6807.2  |
| 5°    | 6115.7  | 6163.1  | 6210.5  | 6261.0  | 6352.5  | 6474.1  | 6594.1  | 6605.1  | 6737.7  | 6835.6  | 6887.7  |
| 7.5°  | 5714.8  | 5757.4  | 5814.2  | 5894.7  | 6024.2  | 6215.2  | 6415.7  | 6439.4  | 6690.4  | 6913.0  | 7029.8  |
| 10°   | 5302.7  | 5337.5  | 5419.5  | 5537.9  | 5716.3  | 5972.1  | 6242.0  | 6281.5  | 6647.7  | 7017.1  | 7222.4  |
| 12.5° | 4862.3  | 4882.8  | 4982.3  | 5152.7  | 5414.8  | 5740.0  | 6095.2  | 6147.3  | 6620.9  | 7137.1  | 7449.7  |
| 15°   | 4527.6  | 4537.1  | 4631.8  | 4808.6  | 5108.5  | 5531.6  | 5981.5  | 6044.7  | 6627.2  | 7280.8  | 7697.5  |
| 17.5° | 4442.4  | 4447.1  | 4497.6  | 4619.2  | 4884.4  | 5345.3  | 5891.6  | 5968.9  | 6646.2  | 7421.3  | 7947.0  |
| 20°   | 4788.1  | 4754.9  | 4702.8  | 4683.9  | 4797.5  | 5233.3  | 5837.9  | 5924.7  | 6671.4  | 7546.0  | 8171.1  |
| 22.5° | 5736.9  | 5639.0  | 5422.7  | 5133.8  | 4958.6  | 5241.2  | 5852.1  | 5938.9  | 6751.9  | 7699.1  | 8430.0  |
| 25°   | 7145.0  | 7009.3  | 6641.4  | 6073.1  | 5526.9  | 5468.5  | 5970.5  | 6058.9  | 6908.2  | 7882.3  | 8677.9  |
| 27.5° | 8747.4  | 8613.2  | 8163.3  | 7351.8  | 6420.4  | 5918.4  | 6242.0  | 6324.1  | 7140.3  | 8044.9  | 8867.3  |
| 30°   | 10281.8 | 10243.9 | 9713.5  | 8791.6  | 7544.4  | 6647.7  | 6592.5  | 6661.9  | 7312.4  | 8142.7  | 9017.3  |
| 32.5° | 11582.6 | 11522.6 | 11096.4 | 10199.7 | 8831.0  | 7523.9  | 7004.5  | 7025.0  | 7441.8  | 8269.0  | 9213.1  |
| 35°   | 12788.7 | 12714.5 | 12340.4 | 11492.6 | 10150.8 | 8594.2  | 7639.1  | 7609.1  | 7724.4  | 8523.2  | 9497.2  |
| 37.5° | 13841.7 | 13909.6 | 13494.4 | 12687.7 | 11334.8 | 9707.2  | 8494.8  | 8404.8  | 8166.4  | 8936.8  | 9909.3  |
| 40°   | 14722.6 | 14722.6 | 14506.3 | 13833.8 | 12613.5 | 10858.0 | 9462.5  | 9344.1  | 8831.0  | 9574.6  | 10431.8 |
| 42.5° | 15039.9 | 15107.8 | 15188.3 | 14807.8 | 13758.0 | 12054.7 | 10540.7 | 10417.6 | 9767.2  | 10479.1 | 11091.7 |
| 45°   | 15058.8 | 15166.2 | 15578.2 | 15576.6 | 14792.0 | 13243.4 | 11756.3 | 11697.9 | 10967.0 | 11641.0 | 11909.4 |
| 47.5° | 14792.0 | 14926.2 | 15605.1 | 15990.3 | 15611.4 | 14350.0 | 13085.5 | 13012.9 | 12376.7 | 13065.0 | 12765.0 |
| 50°   | 14380.0 | 14528.4 | 15317.7 | 16152.9 | 16168.6 | 15313.0 | 14485.8 | 14376.9 | 13928.5 | 14692.6 | 13649.1 |
| 52.5° | 13642.8 | 13930.1 | 15060.4 | 16190.7 | 16534.9 | 16145.0 | 15818.2 | 15770.8 | 15665.0 | 16260.2 | 14353.2 |
| 55°   | 12065.7 | 12384.6 | 14414.7 | 16203.4 | 16874.3 | 16882.2 | 17066.9 | 17079.5 | 17292.6 | 17725.2 | 14877.3 |
| 57.5° | 11320.6 | 11500.5 | 13287.6 | 16263.4 | 17377.9 | 17718.9 | 18339.3 | 18437.2 | 18767.1 | 19116.0 | 15475.6 |
| 60°   | 10851.7 | 11064.8 | 12731.9 | 16181.3 | 18168.8 | 18816.1 | 19518.6 | 19551.7 | 19905.3 | 20551.0 | 16285.5 |
| 62.5° | 10477.6 | 10687.5 | 12381.4 | 15865.5 | 19057.6 | 20135.8 | 20671.0 | 20674.1 | 20939.4 | 22260.7 | 17205.8 |
| 65°   | 9554.1  | 9730.9  | 11672.6 | 15510.3 | 19644.9 | 21441.4 | 22009.7 | 21989.2 | 22205.4 | 24063.5 | 18274.6 |
| 67.5° | 8218.5  | 8354.3  | 10225.0 | 14163.7 | 19423.8 | 22628.5 | 24030.4 | 23962.5 | 23700.4 | 25621.7 | 18694.5 |
| 70°   | 6354.1  | 6403.0  | 8059.1  | 11803.6 | 17352.6 | 23084.8 | 25983.2 | 25948.4 | 24617.6 | 25342.2 | 17155.3 |
| 71°   | 5252.2  | 5413.2  | 7102.4  | 10417.6 | 15965.0 | 22663.2 | 26172.6 | 26193.1 | 24387.1 | 24581.3 | 16096.0 |
| 72.5° | 3050.0  | 3187.3  | 5148.0  | 8000.7  | 13554.4 | 20904.6 | 25190.7 | 25339.1 | 23310.5 | 22358.6 | 13748.6 |
| 75°   | 653.6   | 699.3   | 1908.6  | 3872.5  | 7456.0  | 14651.5 | 19883.2 | 20412.1 | 18999.2 | 15210.4 | 8286.4  |
| 77.5° | 454.7   | 491.0   | 817.7   | 1757.0  | 2464.3  | 7239.7  | 12351.4 | 12948.2 | 11350.6 | 5716.3  | 2652.1  |
| 80°   | 359.9   | 401.0   | 637.8   | 868.3   | 666.2   | 2334.8  | 5785.8  | 6150.5  | 3785.6  | 1275.6  | 446.8   |
| 82.5° | 200.5   | 238.4   | 497.3   | 468.9   | 255.7   | 443.6   | 1619.7  | 1831.2  | 757.8   | 257.3   | 105.8   |
| 85°   | 58.4    | 71.0    | 320.5   | 341.0   | 108.9   | 85.2    | 276.3   | 342.6   | 143.7   | 67.9    | 47.4    |
| 87.5° | 0.0     | 0.0     | 154.7   | 131.0   | 31.6    | 12.6    | 25.3    | 28.4    | 28.4    | 28.4    | 31.6    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



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**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 6780.3  | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 | 6780.3 |
| 2.5°  | 6807.2  | 6818.2 | 6778.8 | 6726.7 | 6671.4 | 6603.5 | 6532.5 | 6477.2 | 6475.7 | 6448.8 | 6422.0 |
| 5°    | 6890.9  | 6884.5 | 6775.6 | 6609.9 | 6414.1 | 6210.5 | 6016.3 | 5796.8 | 5724.2 | 5634.2 | 5604.2 |
| 7.5°  | 7045.6  | 7001.4 | 6770.9 | 6407.8 | 5978.4 | 5552.1 | 5111.7 | 4668.1 | 4478.7 | 4308.2 | 4278.2 |
| 10°   | 7239.7  | 7156.1 | 6740.9 | 6104.7 | 5316.9 | 4530.8 | 3866.1 | 3263.1 | 2997.9 | 2794.2 | 2784.8 |
| 12.5° | 7441.8  | 7313.9 | 6657.2 | 5646.9 | 4450.2 | 3345.2 | 2579.5 | 1986.0 | 1764.9 | 1622.9 | 1635.5 |
| 15°   | 7653.3  | 7462.3 | 6477.2 | 5029.6 | 3463.6 | 2270.1 | 1585.0 | 1236.1 | 1147.7 | 1111.4 | 1120.8 |
| 17.5° | 7869.6  | 7564.9 | 6226.2 | 4286.1 | 2489.5 | 1465.0 | 1097.2 | 999.3  | 999.3  | 1007.2 | 1010.3 |
| 20°   | 8057.5  | 7620.2 | 5856.8 | 3452.5 | 1687.6 | 1067.2 | 959.8  | 945.6  | 953.5  | 966.1  | 967.7  |
| 22.5° | 8243.8  | 7623.4 | 5375.3 | 2607.9 | 1180.8 | 934.6  | 914.0  | 907.7  | 912.5  | 926.7  | 928.3  |
| 25°   | 8395.3  | 7585.5 | 4772.3 | 1854.9 | 942.5  | 880.9  | 871.4  | 868.3  | 871.4  | 888.8  | 888.8  |
| 27.5° | 8456.9  | 7448.1 | 4036.6 | 1304.0 | 844.6  | 820.9  | 817.7  | 820.9  | 825.6  | 838.3  | 839.8  |
| 30°   | 8463.2  | 7208.2 | 3234.7 | 944.0  | 765.7  | 740.4  | 746.7  | 757.8  | 753.0  | 749.9  | 753.0  |
| 32.5° | 8479.0  | 6930.3 | 2453.2 | 776.7  | 699.3  | 659.9  | 652.0  | 652.0  | 633.0  | 622.0  | 615.7  |
| 35°   | 8531.1  | 6603.5 | 1779.2 | 697.8  | 631.5  | 585.7  | 555.7  | 521.0  | 484.6  | 465.7  | 461.0  |
| 37.5° | 8613.2  | 6261.0 | 1274.0 | 645.7  | 571.5  | 519.4  | 462.5  | 401.0  | 348.9  | 334.7  | 334.7  |
| 40°   | 8763.1  | 5907.3 | 942.5  | 604.6  | 524.1  | 459.4  | 374.1  | 293.6  | 246.3  | 238.4  | 238.4  |
| 42.5° | 8999.9  | 5534.8 | 751.4  | 568.3  | 483.1  | 397.8  | 285.7  | 213.1  | 178.4  | 173.7  | 172.1  |
| 45°   | 9246.2  | 5124.3 | 656.7  | 533.6  | 438.9  | 326.8  | 211.5  | 157.9  | 137.3  | 132.6  | 132.6  |
| 47.5° | 9492.5  | 4687.0 | 610.9  | 500.4  | 396.2  | 254.2  | 157.9  | 124.7  | 115.2  | 115.2  | 116.8  |
| 50°   | 9700.9  | 4230.8 | 577.8  | 464.1  | 341.0  | 192.6  | 124.7  | 105.8  | 102.6  | 108.9  | 110.5  |
| 52.5° | 9753.0  | 3782.5 | 536.7  | 418.3  | 273.1  | 146.8  | 102.6  | 93.1   | 93.1   | 93.1   | 93.1   |
| 55°   | 9721.4  | 3435.2 | 483.1  | 361.5  | 202.1  | 116.8  | 88.4   | 82.1   | 80.5   | 80.5   | 80.5   |
| 57.5° | 9828.7  | 3229.9 | 386.8  | 281.0  | 145.2  | 94.7   | 77.4   | 72.6   | 69.5   | 67.9   | 67.9   |
| 60°   | 10045.0 | 3095.8 | 276.3  | 202.1  | 108.9  | 78.9   | 66.3   | 61.6   | 56.8   | 53.7   | 53.7   |
| 62.5° | 10332.3 | 2978.9 | 205.2  | 150.0  | 83.7   | 63.1   | 55.3   | 50.5   | 44.2   | 41.0   | 41.0   |
| 65°   | 10553.3 | 2770.5 | 156.3  | 112.1  | 63.1   | 50.5   | 42.6   | 41.0   | 31.6   | 28.4   | 26.8   |
| 67.5° | 10215.5 | 2312.7 | 126.3  | 82.1   | 47.4   | 39.5   | 33.2   | 31.6   | 18.9   | 15.8   | 15.8   |
| 70°   | 8761.6  | 1610.2 | 101.0  | 60.0   | 34.7   | 31.6   | 26.8   | 20.5   | 14.2   | 12.6   | 12.6   |
| 71°   | 7945.4  | 1345.0 | 91.6   | 50.5   | 30.0   | 30.0   | 25.3   | 17.4   | 12.6   | 11.1   | 11.1   |
| 72.5° | 6600.4  | 955.1  | 77.4   | 39.5   | 26.8   | 31.6   | 26.8   | 15.8   | 12.6   | 11.1   | 9.5    |
| 75°   | 3831.4  | 399.4  | 53.7   | 26.8   | 20.5   | 37.9   | 34.7   | 14.2   | 9.5    | 7.9    | 7.9    |
| 77.5° | 1152.4  | 146.8  | 30.0   | 17.4   | 15.8   | 33.2   | 39.5   | 12.6   | 4.7    | 1.6    | 1.6    |
| 80°   | 210.0   | 63.1   | 18.9   | 11.1   | 11.1   | 20.5   | 30.0   | 6.3    | 0.0    | 0.0    | 0.0    |
| 82.5° | 74.2    | 31.6   | 11.1   | 6.3    | 4.7    | 9.5    | 14.2   | 0.0    | 0.0    | 0.0    | 0.0    |
| 85°   | 42.6    | 22.1   | 6.3    | 3.2    | 0.0    | 1.6    | 3.2    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 28.4    | 6.3    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |



LM-79-2019: Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products

Report Prepared for

Cooper Lighting Solutions

Invue

Report Number: SP1-2407-157-9

Test Date: 10/03/2024

Luminaire Tested: EMM2-HTN-SA1A-827-U-5WQ

Data applicable to all product families utilizing light square engine

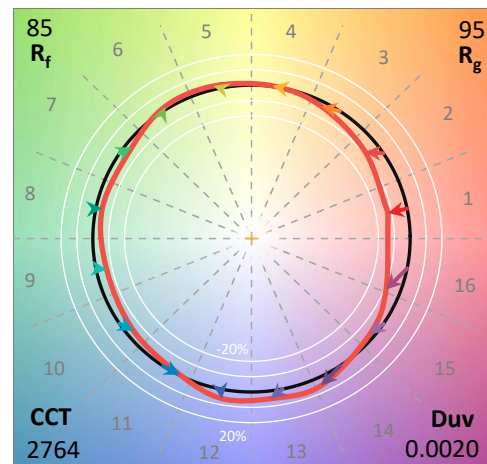
### Test Information

Test Method: LM-79-2019  
 Report Number: SP1-2407-157-9  
 Test Lab: COOPER LIGHTING SOLUTIONS  
 Photometer: SP1 - 76IN SPHERE  
 Measurement Geometry:  $4\pi$   
 Issue Date: 10/03/2024  
 Manufacturer: COOPER LIGHTING SOLUTIONS  
 Product Line: Invue  
 Catalog Number: **EMM2-HTN-SA1A-827-U-5WQ**  
 Description: Epic Modern Light Square 40W 5WQ Optic

### Spectral Parameters

CCT (K): 2764  
 CIE  $u'$ : 0.2591  
 CIE  $v'$ : 0.5290  
 Duv: 0.0020  
 CIE x: 0.4581  
 CIE y: 0.4156  
 CIE z: 0.1263  
 Peak Wavelength (nm): 603  
 Dominant Wavelength (nm): 583  
 Purity: 62.2537  
 R<sub>f</sub>: 84.7  
 R<sub>g</sub>: 94.6

CRI (Ra): 80.9  
 R1: 78.8  
 R2: 89.9  
 R3: 96.2  
 R4: 79.1  
 R5: 79.1  
 R6: 88.8  
 R7: 81.3  
 R8: 54.3  
 R9: -1.5  
 R10: 77.9  
 R11: 78.9  
 R12: 71.6  
 R13: 81.2  
 R14: 98.5  
 R15: 69.9



### Test Conditions

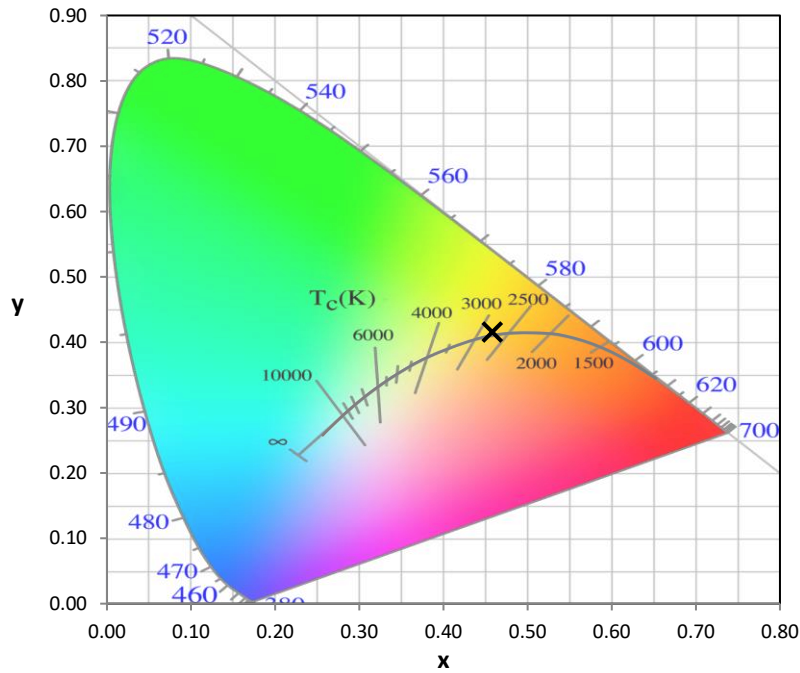
Stabilization Time: 81M  
 Operation Time: 2H 21M  
 Sphere Temperature (°C): 25.2

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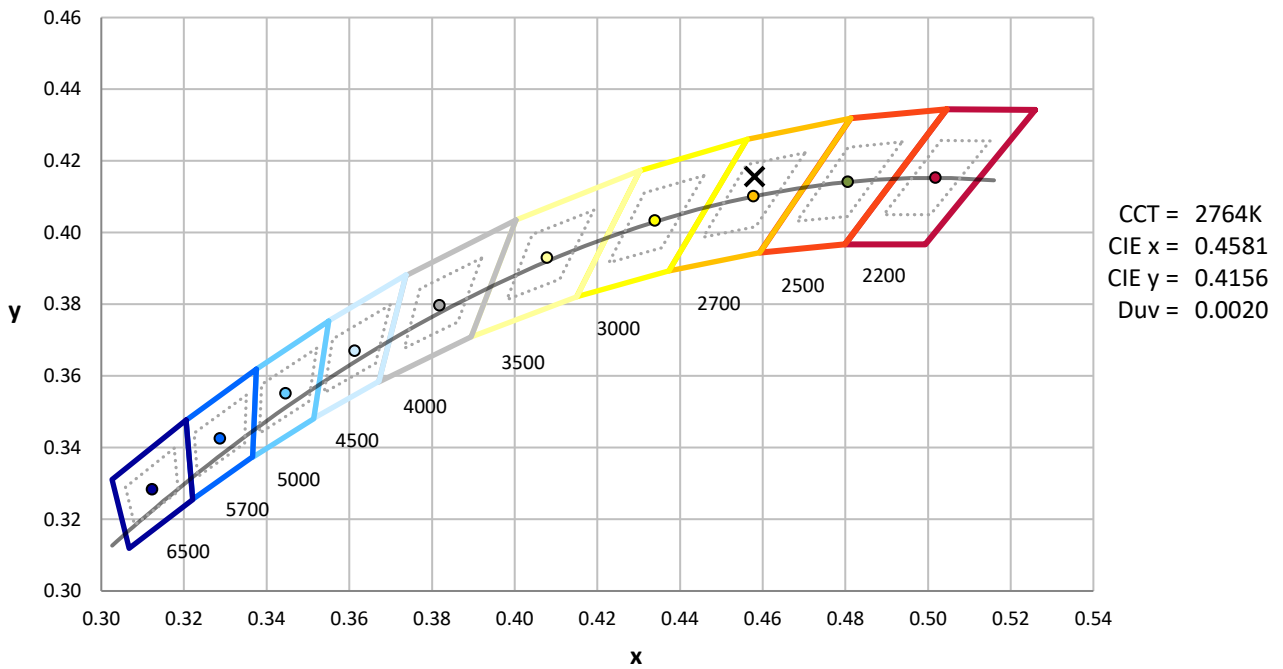
| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/18/2024        | 12/18/2024           |
| Power Meter                    | INXT2011004           | 2/8/2024         | 2/8/2025             |
| AC Power Source                | IN0063                | 10/24/2023       | 10/24/2024           |
| DC Power Source                | IN0208                | 10/24/2023       | 10/24/2024           |
| Sphere Thermometer             | IN0085                | 10/24/2023       | 10/24/2024           |
| Room Thermometer               | IN0046                | 10/24/2023       | 10/24/2024           |

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**CIE 1931 Chromaticity Diagram**



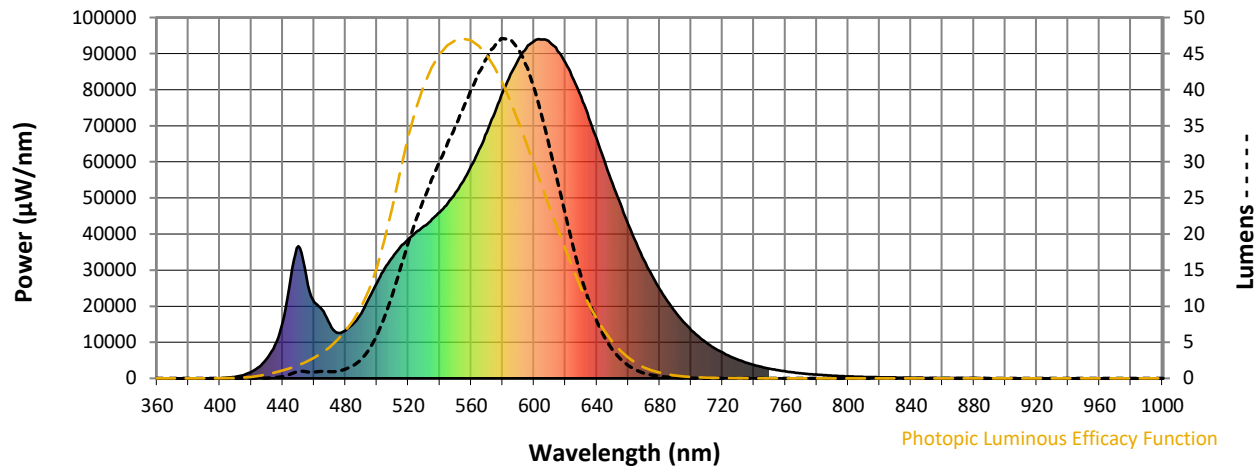
**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 2700K 4-step quadrangle

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### Photopic Flux vs. Wavelength

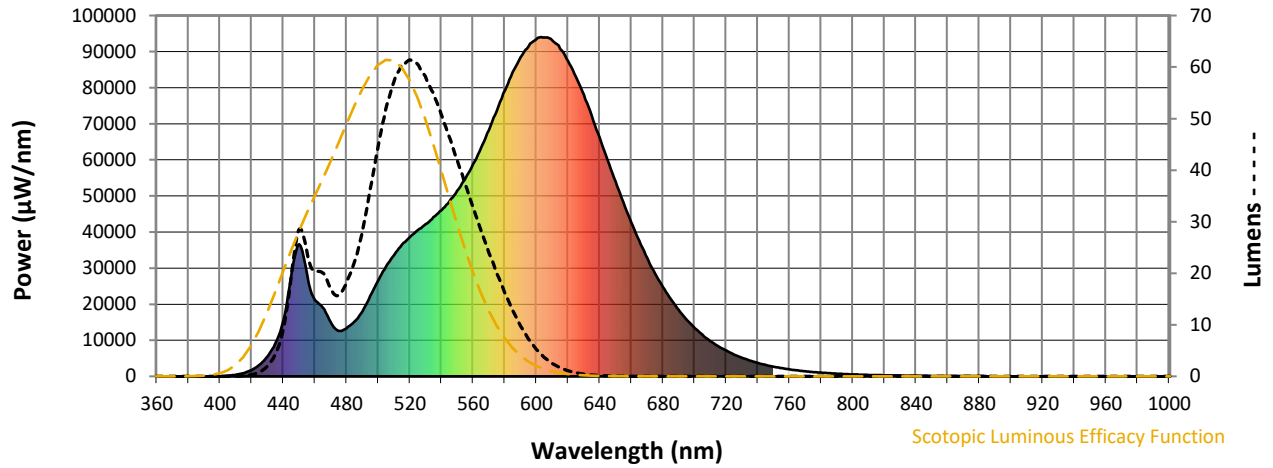


### Photopic Lumens: 4337.9

| λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) | λ (nm) | Power (μW/nm) | Lumens (φ/nm) |
|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|--------|---------------|---------------|
| 360    | 0             | 0.0           | 490    | 18018         | 2.6           | 620    | 87426         | 22.8          | 750    | 2680          | 0.0           | 880    | 58            | 0.0           |
| 365    | 0             | 0.0           | 495    | 22295         | 3.9           | 625    | 83013         | 18.2          | 755    | 2287          | 0.0           | 885    | 46            | 0.0           |
| 370    | 0             | 0.0           | 500    | 26478         | 5.8           | 630    | 78077         | 14.1          | 760    | 1944          | 0.0           | 890    | 45            | 0.0           |
| 375    | 0             | 0.0           | 505    | 30524         | 8.5           | 635    | 72080         | 10.7          | 765    | 1653          | 0.0           | 895    | 41            | 0.0           |
| 380    | 0             | 0.0           | 510    | 33611         | 11.5          | 640    | 66249         | 7.9           | 770    | 1413          | 0.0           | 900    | 38            | 0.0           |
| 385    | 0             | 0.0           | 515    | 36490         | 15.2          | 645    | 59973         | 5.7           | 775    | 1198          | 0.0           | 905    | 33            | 0.0           |
| 390    | 0             | 0.0           | 520    | 38610         | 18.7          | 650    | 53972         | 3.9           | 780    | 1025          | 0.0           | 910    | 30            | 0.0           |
| 395    | 0             | 0.0           | 525    | 40511         | 21.9          | 655    | 48369         | 2.7           | 785    | 874           | 0.0           | 915    | 23            | 0.0           |
| 400    | 48            | 0.0           | 530    | 42223         | 24.9          | 660    | 42641         | 1.8           | 790    | 747           | 0.0           | 920    | 24            | 0.0           |
| 405    | 201           | 0.0           | 535    | 44137         | 27.6          | 665    | 37602         | 1.1           | 795    | 639           | 0.0           | 925    | 22            | 0.0           |
| 410    | 457           | 0.0           | 540    | 46032         | 30.0          | 670    | 32798         | 0.7           | 800    | 547           | 0.0           | 930    | 22            | 0.0           |
| 415    | 925           | 0.0           | 545    | 48553         | 32.5          | 675    | 28558         | 0.5           | 805    | 473           | 0.0           | 935    | 17            | 0.0           |
| 420    | 1816          | 0.0           | 550    | 51408         | 34.9          | 680    | 24782         | 0.3           | 810    | 401           | 0.0           | 940    | 13            | 0.0           |
| 425    | 3217          | 0.0           | 555    | 54711         | 37.4          | 685    | 21386         | 0.2           | 815    | 351           | 0.0           | 945    | 6             | 0.0           |
| 430    | 5520          | 0.0           | 560    | 58847         | 40.0          | 690    | 18413         | 0.1           | 820    | 307           | 0.0           | 950    | 10            | 0.0           |
| 435    | 9225          | 0.1           | 565    | 63386         | 42.4          | 695    | 15721         | 0.1           | 825    | 261           | 0.0           | 955    | 11            | 0.0           |
| 440    | 15522         | 0.2           | 570    | 68196         | 44.3          | 700    | 13432         | 0.0           | 830    | 228           | 0.0           | 960    | 8             | 0.0           |
| 445    | 27642         | 0.6           | 575    | 73613         | 46.0          | 705    | 11513         | 0.0           | 835    | 193           | 0.0           | 965    | 12            | 0.0           |
| 450    | 36602         | 0.9           | 580    | 79207         | 47.1          | 710    | 9780          | 0.0           | 840    | 174           | 0.0           | 970    | 3             | 0.0           |
| 455    | 28292         | 0.9           | 585    | 84248         | 47.0          | 715    | 8356          | 0.0           | 845    | 151           | 0.0           | 975    | 8             | 0.0           |
| 460    | 21166         | 0.9           | 590    | 88397         | 45.7          | 720    | 7161          | 0.0           | 850    | 123           | 0.0           | 980    | 2             | 0.0           |
| 465    | 19092         | 1.0           | 595    | 91428         | 43.4          | 725    | 6067          | 0.0           | 855    | 106           | 0.0           | 985    | 13            | 0.0           |
| 470    | 14951         | 0.9           | 600    | 93452         | 40.3          | 730    | 5164          | 0.0           | 860    | 95            | 0.0           | 990    | 16            | 0.0           |
| 475    | 12606         | 1.0           | 605    | 93959         | 36.4          | 735    | 4393          | 0.0           | 865    | 82            | 0.0           | 995    | 20            | 0.0           |
| 480    | 13323         | 1.3           | 610    | 93079         | 32.0          | 740    | 3694          | 0.0           | 870    | 77            | 0.0           | 1000   | 0             | 0.0           |
| 485    | 15164         | 1.8           | 615    | 90707         | 27.3          | 745    | 3157          | 0.0           | 875    | 65            | 0.0           |        |               |               |

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### Scotopic Flux vs. Wavelength



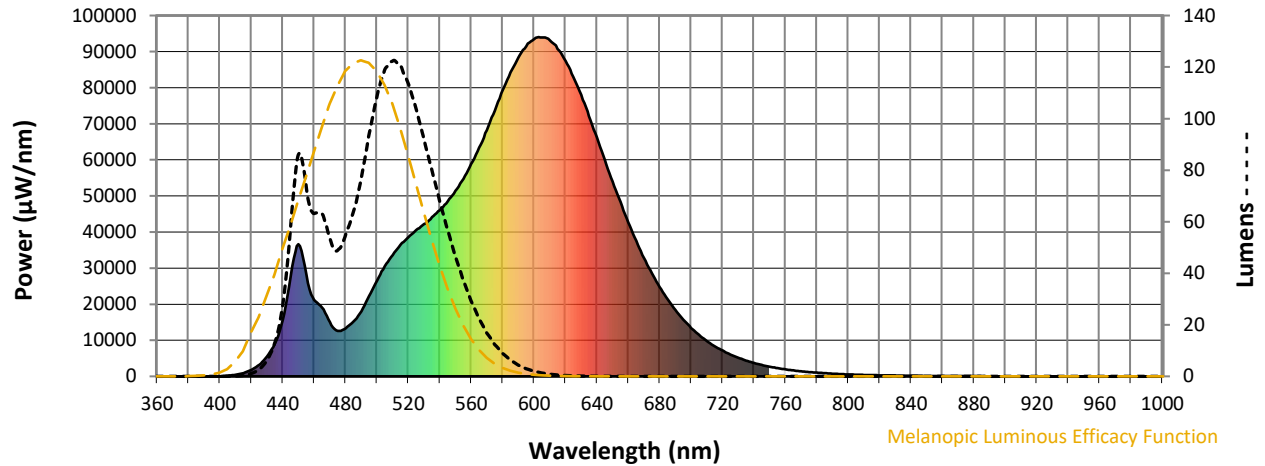
Scotopic Lumens: 5286.7

S/P: 1.22

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 75.9             | 620       | 87426            | 0.4              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 93.2             | 625       | 83013            | 0.2              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 107.8            | 630       | 78077            | 0.1              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 118.7            | 635       | 72080            | 0.1              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 122.2            | 640       | 66249            | 0.1              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 120.8            | 645       | 59973            | 0.0              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 113.9            | 650       | 53972            | 0.0              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 104.1            | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 92.4             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 80.5             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.1              | 540       | 46032            | 68.2             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.3              | 545       | 48553            | 57.1             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 1.1              | 550       | 51408            | 46.7             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 2.5              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 5.9              | 560       | 58847            | 29.4             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 12.5             | 565       | 63386            | 22.5             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 26.3             | 570       | 68196            | 16.9             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 55.2             | 575       | 73613            | 12.4             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 85.4             | 580       | 79207            | 9.0              | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 75.1             | 585       | 84248            | 6.3              | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 63.2             | 590       | 88397            | 4.4              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 63.2             | 595       | 91428            | 3.0              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 54.2             | 600       | 93452            | 2.0              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 48.8             | 605       | 93959            | 1.3              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 54.2             | 610       | 93079            | 0.9              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 63.3             | 615       | 90707            | 0.5              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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### Melanopic Flux vs. Wavelength



**Melanopic Lumens: 9797**

**M/P: 2.26**

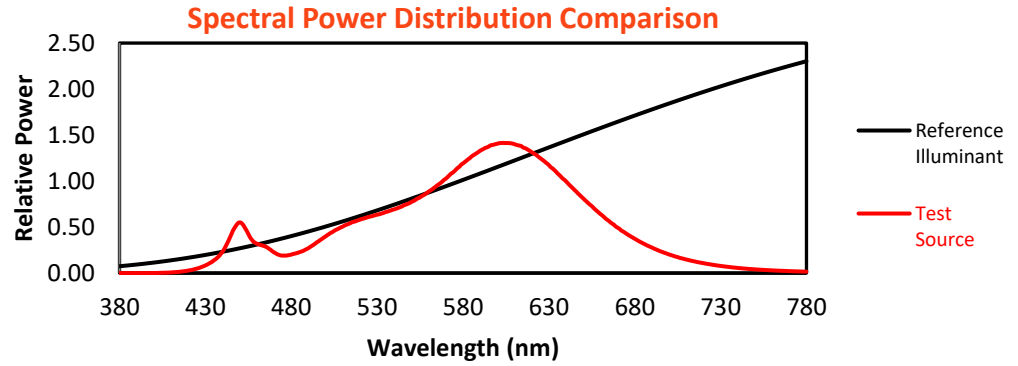
| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(Φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 0                | 0.0              | 490       | 18018            | 27.7             | 620       | 87426            | 1.1              | 750       | 2680             | 0.0              | 880       | 58               | 0.0              |
| 365       | 0                | 0.0              | 495       | 22295            | 36.0             | 625       | 83013            | 0.7              | 755       | 2287             | 0.0              | 885       | 46               | 0.0              |
| 370       | 0                | 0.0              | 500       | 26478            | 44.2             | 630       | 78077            | 0.4              | 760       | 1944             | 0.0              | 890       | 45               | 0.0              |
| 375       | 0                | 0.0              | 505       | 30524            | 51.8             | 635       | 72080            | 0.3              | 765       | 1653             | 0.0              | 895       | 41               | 0.0              |
| 380       | 0                | 0.0              | 510       | 33611            | 57.0             | 640       | 66249            | 0.2              | 770       | 1413             | 0.0              | 900       | 38               | 0.0              |
| 385       | 0                | 0.0              | 515       | 36490            | 60.5             | 645       | 59973            | 0.1              | 775       | 1198             | 0.0              | 905       | 33               | 0.0              |
| 390       | 0                | 0.0              | 520       | 38610            | 61.4             | 650       | 53972            | 0.1              | 780       | 1025             | 0.0              | 910       | 30               | 0.0              |
| 395       | 0                | 0.0              | 525       | 40511            | 60.6             | 655       | 48369            | 0.0              | 785       | 874              | 0.0              | 915       | 23               | 0.0              |
| 400       | 48               | 0.0              | 530       | 42223            | 58.2             | 660       | 42641            | 0.0              | 790       | 747              | 0.0              | 920       | 24               | 0.0              |
| 405       | 201              | 0.0              | 535       | 44137            | 55.0             | 665       | 37602            | 0.0              | 795       | 639              | 0.0              | 925       | 22               | 0.0              |
| 410       | 457              | 0.0              | 540       | 46032            | 50.9             | 670       | 32798            | 0.0              | 800       | 547              | 0.0              | 930       | 22               | 0.0              |
| 415       | 925              | 0.1              | 545       | 48553            | 46.6             | 675       | 28558            | 0.0              | 805       | 473              | 0.0              | 935       | 17               | 0.0              |
| 420       | 1816             | 0.3              | 550       | 51408            | 42.0             | 680       | 24782            | 0.0              | 810       | 401              | 0.0              | 940       | 13               | 0.0              |
| 425       | 3217             | 0.8              | 555       | 54711            | 37.4             | 685       | 21386            | 0.0              | 815       | 351              | 0.0              | 945       | 6                | 0.0              |
| 430       | 5520             | 1.9              | 560       | 58847            | 32.9             | 690       | 18413            | 0.0              | 820       | 307              | 0.0              | 950       | 10               | 0.0              |
| 435       | 9225             | 4.1              | 565       | 63386            | 28.4             | 695       | 15721            | 0.0              | 825       | 261              | 0.0              | 955       | 11               | 0.0              |
| 440       | 15522            | 8.7              | 570       | 68196            | 24.1             | 700       | 13432            | 0.0              | 830       | 228              | 0.0              | 960       | 8                | 0.0              |
| 445       | 27642            | 18.5             | 575       | 73613            | 20.0             | 705       | 11513            | 0.0              | 835       | 193              | 0.0              | 965       | 12               | 0.0              |
| 450       | 36602            | 28.3             | 580       | 79207            | 16.3             | 710       | 9780             | 0.0              | 840       | 174              | 0.0              | 970       | 3                | 0.0              |
| 455       | 28292            | 24.7             | 585       | 84248            | 12.9             | 715       | 8356             | 0.0              | 845       | 151              | 0.0              | 975       | 8                | 0.0              |
| 460       | 21166            | 20.4             | 590       | 88397            | 9.8              | 720       | 7161             | 0.0              | 850       | 123              | 0.0              | 980       | 2                | 0.0              |
| 465       | 19092            | 20.1             | 595       | 91428            | 7.3              | 725       | 6067             | 0.0              | 855       | 106              | 0.0              | 985       | 13               | 0.0              |
| 470       | 14951            | 17.2             | 600       | 93452            | 5.3              | 730       | 5164             | 0.0              | 860       | 95               | 0.0              | 990       | 16               | 0.0              |
| 475       | 12606            | 15.7             | 605       | 93959            | 3.7              | 735       | 4393             | 0.0              | 865       | 82               | 0.0              | 995       | 20               | 0.0              |
| 480       | 13323            | 18.0             | 610       | 93079            | 2.5              | 740       | 3694             | 0.0              | 870       | 77               | 0.0              | 1000      | 0                | 0.0              |
| 485       | 15164            | 21.9             | 615       | 90707            | 1.7              | 745       | 3157             | 0.0              | 875       | 65               | 0.0              |           |                  |                  |

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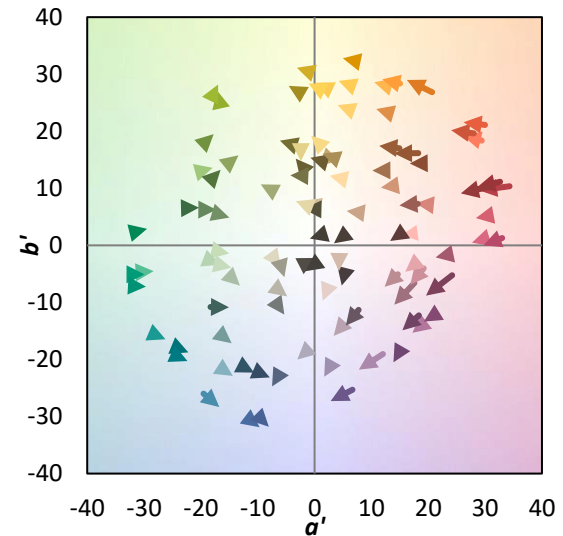
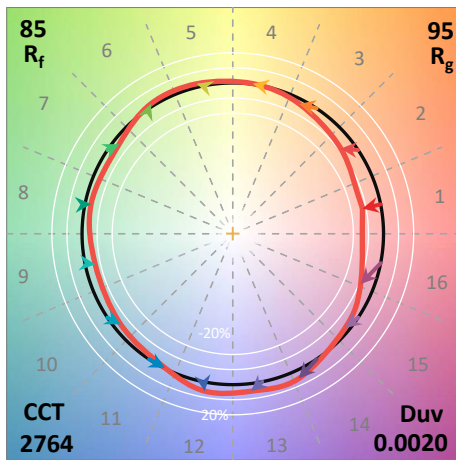
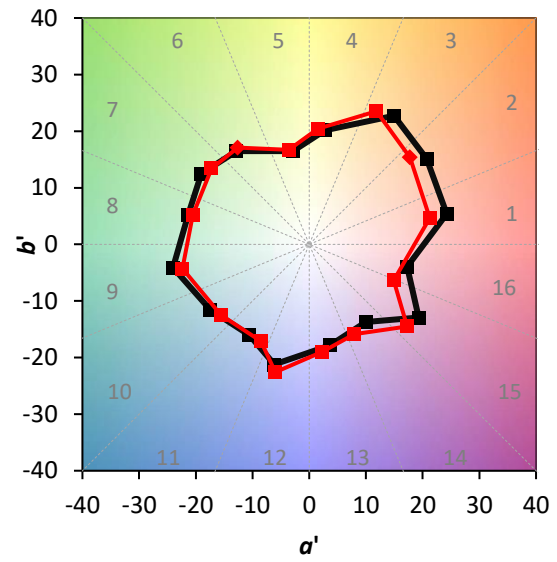
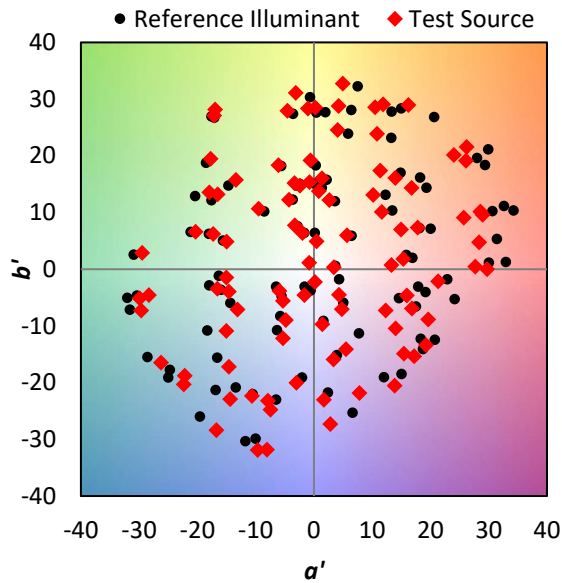
TM-30-18

### Summary

$R_f = 84.7$   
 $R_g = 94.6$   
 $CIE\ R_a = 80.9$   
 $R_g = -1.5$



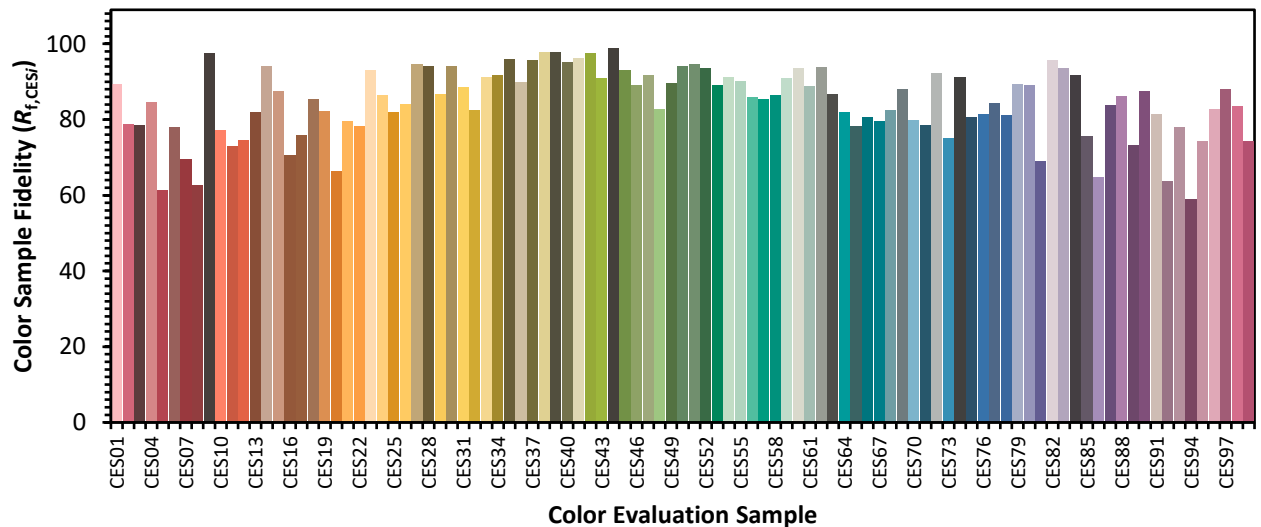
### Color Vector Graphics



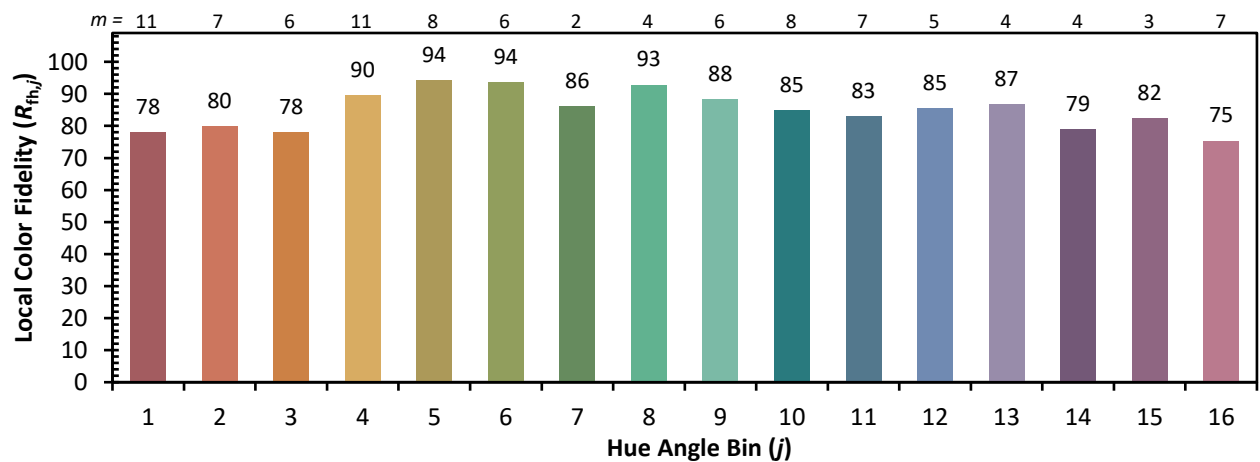
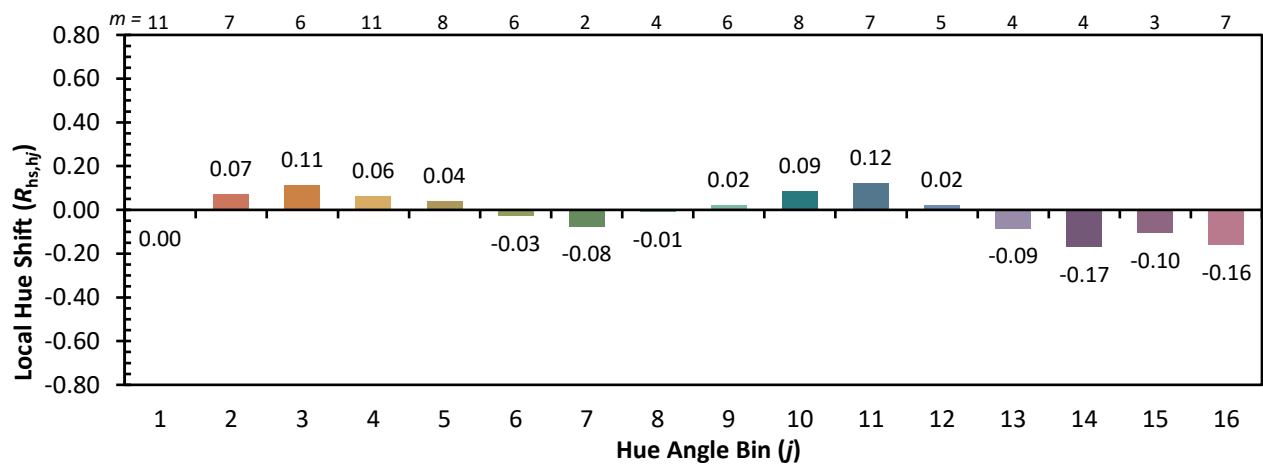
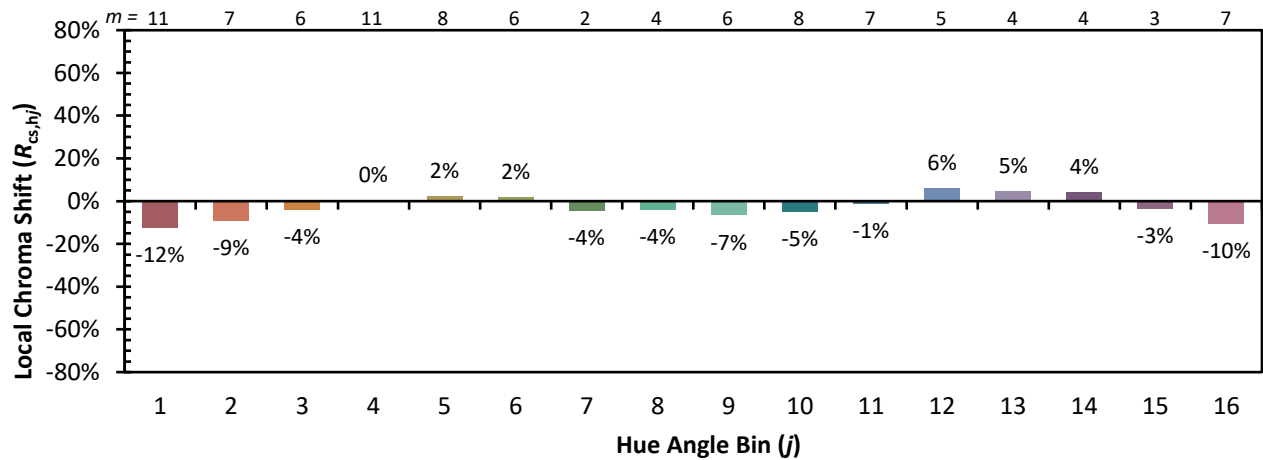


**Individual Sample Fidelity Index ( $R_{f,i}$ )**

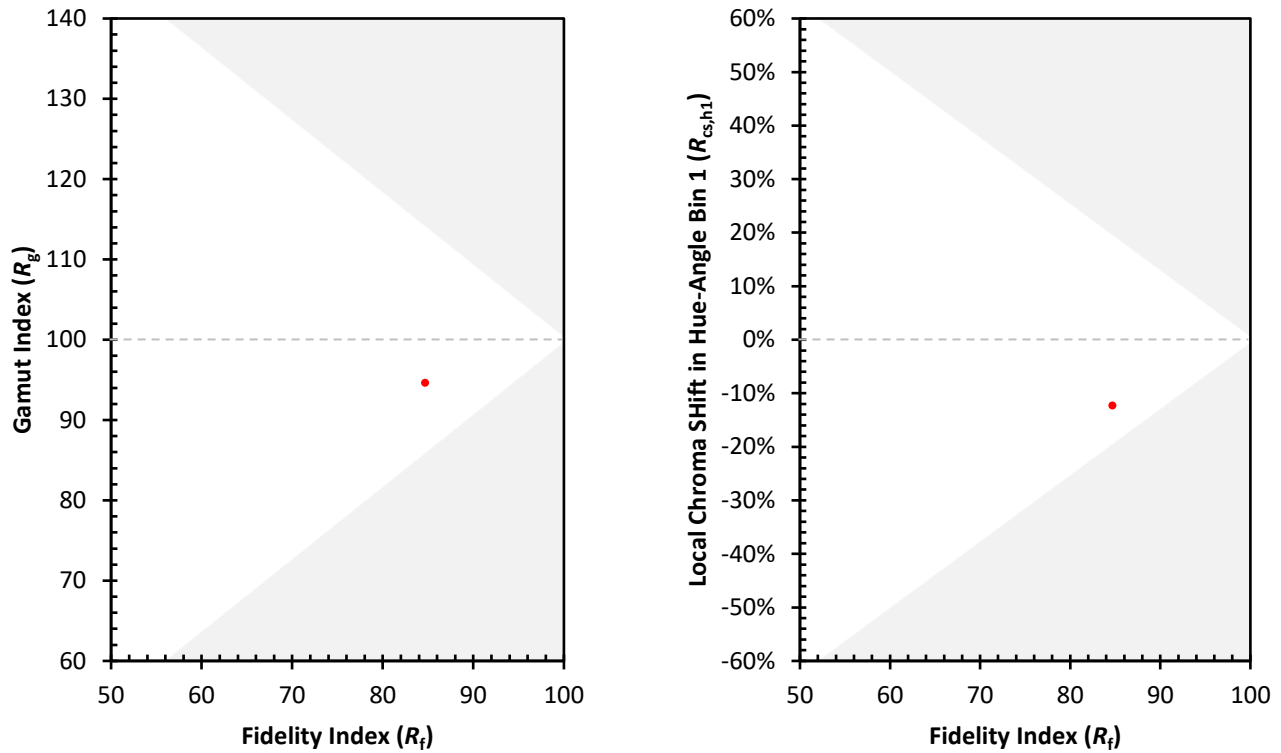
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 84 | CES51 = 95 | CES76 = 81 |
| CES02 = 63 | CES27 = 95 | CES52 = 94 | CES77 = 84 |
| CES03 = 31 | CES28 = 94 | CES53 = 89 | CES78 = 81 |
| CES04 = 71 | CES29 = 87 | CES54 = 91 | CES79 = 89 |
| CES05 = 50 | CES30 = 94 | CES55 = 90 | CES80 = 89 |
| CES06 = 52 | CES31 = 89 | CES56 = 86 | CES81 = 69 |
| CES07 = 43 | CES32 = 82 | CES57 = 85 | CES82 = 96 |
| CES08 = 41 | CES33 = 91 | CES58 = 86 | CES83 = 93 |
| CES09 = 29 | CES34 = 92 | CES59 = 91 | CES84 = 92 |
| CES10 = 77 | CES35 = 96 | CES60 = 94 | CES85 = 76 |
| CES11 = 60 | CES36 = 90 | CES61 = 89 | CES86 = 65 |
| CES12 = 66 | CES37 = 96 | CES62 = 94 | CES87 = 84 |
| CES13 = 44 | CES38 = 98 | CES63 = 87 | CES88 = 86 |
| CES14 = 74 | CES39 = 98 | CES64 = 82 | CES89 = 73 |
| CES15 = 72 | CES40 = 95 | CES65 = 78 | CES90 = 88 |
| CES16 = 48 | CES41 = 96 | CES66 = 81 | CES91 = 82 |
| CES17 = 50 | CES42 = 97 | CES67 = 80 | CES92 = 64 |
| CES18 = 57 | CES43 = 91 | CES68 = 83 | CES93 = 78 |
| CES19 = 73 | CES44 = 99 | CES69 = 88 | CES94 = 59 |
| CES20 = 67 | CES45 = 93 | CES70 = 80 | CES95 = 74 |
| CES21 = 87 | CES46 = 89 | CES71 = 79 | CES96 = 83 |
| CES22 = 79 | CES47 = 92 | CES72 = 92 | CES97 = 88 |
| CES23 = 92 | CES48 = 83 | CES73 = 75 | CES98 = 83 |
| CES24 = 91 | CES49 = 90 | CES74 = 91 | CES99 = 74 |
| CES25 = 72 | CES50 = 94 | CES75 = 81 |            |



Color Rendition by Hue-Angle Bin



**Measure Comparisons**



(END OF REPORT)